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REPRESENTATION OF 3D ATMOSPHERIC DATA USING A MULTI-STAGE VISUALIZATION PIPELINE

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Abstract

The representation of relevant information from data generated through atmospheric imaging is of substantial importance to environmental sciences, meteorology, as well as in weather hazard predictive models for disaster prevention. As the techniques for the acquisition of such data have progressed and grown in complexity, so have the visualization algorithms required to process the related data and to produce images or animations of the underlying information. To this extent, we present a generic pipeline for the visualization of 3D atmospheric data. Specifically, we focus on hurricane data sets, which contain a significant amount of varied information which may be difficult to properly isolate thought conventional means. The pipeline involves the use of sampling, classification and rendering techniques which convert raw data originating from 3D acquisition means into images which reveal meaningful information on atmospheric and meteorological measurements such as water content, rainfall patterns or wind direction and velocity. We describe the steps involved in processing such data and provide images generated by our rendering framework which illustrate the results. The underlying algorithms fully exploit the capabilities of modern graphics processing units (GPUs), enabling fast and efficient real-time exploration and inspection of the data.

Key words: atmospheric imaging, data set, hurricane, real time exploration, visualization algorithm

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